



Leveraging Economic Benefits of the Natural Resources of the Lower Chickahominy River

Grant #NA18NOS4190152

Task #93.04

Prepared for

Virginia Coastal Zone Management Program (VCZMP)

Virginia Department of Environmental Quality (VDEQ)

Richmond, Virginia

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June 2020



This research project, Task #93.04 was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant FY2017 #NA18NOS4190152 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its sub agencies.

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Introduction

In 2016, the Virginia Coastal Zone Management Program (VCZMP) initiated a comprehensive strategic planning process in collaboration with the three counties that include the Lower Chickahominy River watershed (LCW) and the Richmond area Regional Planning District Commission (PlanRVA) to create a community focused vision for conservation and supportive land uses that promote both environmental protection and economic opportunity. In a previous phase of the project, we teamed with the consulting firm Urban Analytics in an analysis of the fiscal and economic benefits of land conservation in the LCW. That study¹ confirmed that the counties in the watershed, which include Charles City County, James City County, and New Kent County, see net fiscal revenues from conserved lands and enjoy modest, but important, economic impacts from business activities directly and indirectly tied to conserved lands. In another study closely tied to this effort, the Institute for Engagement and Negotiation (IEN) at the University of Virginia performed stakeholder engagement activities in the LCW to, in part, identify policies and strategies for enhancing ecological and socio-economic benefits for local communities in the watershed. The IEN engagement work² found strongly positive attitudes towards the public acceptance, feasibility and viability of developing policies and programs for using the river as a “soft” driver of economic development in the region. In the work presented here, we offer a preliminary economic development strategy identifying economic development opportunities that fit within the overall LCW goals.

Using the information gained from the IEN stakeholder engagement, and our previous interactions with economic development entities in the watershed as a part of our socio-economic impact assessment, we have taken a mixed methods (quantitative and qualitative) approach in identifying specific industry opportunities for economic growth and business development that meet the conservation mandates of the LCW plan. The results of our analysis offer an actionable framework from which the economic development authorities in each of the counties can choose specific industry targets of opportunity that best fit within their overall economic development strategies and conservation goals. Our approach in this report is to present our findings in brief, highly graphical formats to facilitate a rapid review and assessment of our recommendations that is sufficiently clear to economic development practitioners but also easily understood by a general audience. Detailed data used in the analysis can be found in a separate Technical Appendix.

Identifying Target Industries

Stakeholder engagement processes identified examples of environmentally sensitive economic activities related to coastal resources including eco-tourism, tribal history tours, fishing and aquaculture. We expand on that list based on our previous studies in the LCW and a similar study conducted for the Virginia Coastal Zone Management Program on Virginia’s Eastern Shore to

¹ Clower, T. & Bellas, D. (2019). Socio-Economic Impacts of Conserved Land in the Lower Chickahominy River Watershed. Grant #:NA17NOS4190152, Task#93.02. Virginia Coastal Zone Management Program

² Institute for Engagement and Negotiation (January 2020). Lower Chickahominy Watershed Project, Stakeholder Survey Summary.

include accommodations for visitors. Importantly, we also consider the support industries and downstream economic sectors that make up the value chain for each of the “core” industries.

There has been much in the news about business supply chains in recent months. The supply chain for a given business includes vendors who provide raw materials, intermediate goods and business services that are the inputs for the subject business. We also include the subject company’s customers, who may be other businesses or end-user consumers. A value chain is structurally the same as a supply chain but expressed as an aggregated industry – instead of the supply chain for a firm that operates boat tours, we describe the value chain for tour operators. Our goal is to add to the target industry list not only the core industries but identify economic development opportunities across the value chains of these industries. By taking this approach, a region can increase the total economic and fiscal impacts of business development occurring in the core industries. Table 1 shows the core industries included in this analysis.

Table 1: Core Target Industries Leverage Economic Opportunity in the LCW

Core Target Industries	Description
Scenic & Sightseeing Water Transportation	Boat excursions, fishing charters, river sightseeing, dinner cruises, organized blueway tours.
Tour Operators	Arranging and assembling tours sold through tour operators or travel agencies
Nature Parks and Similar Institutions	Wildlife sanctuaries, conservation areas, nature centers or preserves
Other Amusement & Recreation Industries	Recreational day camps, paddling clubs (not marinas), riding stables, other
Hotels and Motels ³	With or without food and other services
Other Traveler Accommodation	B&B, guest houses, cabins, youth hostels
Finfish Farming	Hatcheries, farm raising finfish
Shellfish Farming	Farming crayfish, clams, mollusks

It is important to note some industry sectors that are not included in our Core Target Industries. We do not include marinas, though there are multiple marinas currently operating in the LCW. These are not included because one of the sustainability goals is to limit the development of new intrusive water access infrastructure, especially those related to motorized boats. We also do not include commercial finfish or shellfish fishing operations, which is categorized separately from farming activities for these products. Our initial judgment is that the production capacity of the river would not support commercial scale fishing operations without negatively affecting other business activities with lower environmental impacts. Finfish or shellfish farming, or other aquaculture business activities could be based on the river or inland in either open or closed systems. In particular, aquaponics (plant and fish co-cultured) have both a small environmental

³ For the purposes of this study, Hotels and Motels are defined as the industry sector that does not include casino hotels.

footprint (water is cleaned and reused in closed systems) and potential for ecotourism of operation facilities

Value Chain Analyses

For each of the Core Target Industries listed above, we performed a value chain assessment to identify related potential growth industries. The model begins with inter-industry purchasing structures at the national level. In an ideal world, our assessment would consider international supply chain components, but these data are not readily available. However, for a regional analysis in the LCW, domestic purchasing patterns serve as a reasonable proxy for the supply/value chains of our core industries. Once determining these inter-industry connections, we apply region-specific data⁴ to better identify regional economic strengths, emerging opportunities, and the gaps that might eventually be filled through the economic development process. This knowledge will help inform strategies to grow and strengthen the region's targeted core industry clusters.

For each of the core industries we present a value-chain diagram (or “value-chain map”). These diagrams lay out each core industry's *forward linkages* (sales made by the core industry, or market opportunities) and *backward linkages* (purchases made by the core industry, or supplier opportunities).⁵ The linked industries identified in these diagrams do not represent all of the linkages. Instead, they focus on those relationships that are most extensive in terms of the size of the transactions and “close” in terms of how directly the core industry interacts with other U.S. industries through either a buying or selling relationship. Several of the forward and backward linked industries appear across multiple core sectors, which is expected when the core sectors are themselves related. To determine the most significant linked industries, our model considers three factors:

- The directionality of the flows. Are the linkages forward or backward linkages?
- The structure of the flows. Who does the core industry buy from, or sell to, most directly?
- The volume of flows. What industries does the core industry buy from, and sell to, the most?

Figure 1 provides a guide for reading the value-chain diagrams that will follow in the report.⁶ The colored boxes indicate how concentrated each linked industry is in the local economy. The up or down arrows in the linked industry boxes depict whether an industry is growing or declining regionally. The colored arrows leading to and from the core industry indicate the flow of trade—whether the core industry is purchasing or selling within the key sector. The purpose is to identify industries and firms that have extensive trading relationships and are experiencing growth in the LCW area. Linked industries that are growing or highly concentrated within the region reinforce the potential strength of the core industry and bode well for efforts for further development of the

⁴ Unless noted otherwise, the analysis uses data provided by Chmura Economics JobsEQ (www.chmuraecon.com). Chmura Economics is a nationally recognized proprietary data vendor based in Richmond, VA.

⁵ This approach does not account for the ultimate consumer of these goods (final demand), therefore if an aircraft manufacturer sells jets to the Department of Defense, “Government” would not appear as a forward linkage.

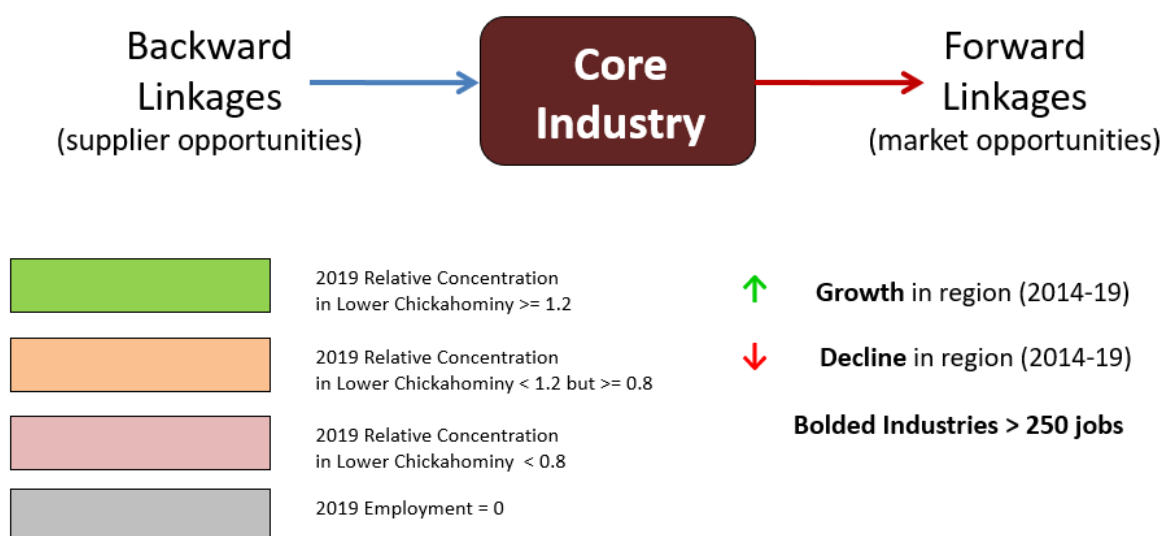
⁶ It should be noted that the core industry often buys and sells with other firms in its own industry. As a result, the diagrams regularly show that core industries are often closely linked to themselves.

core industry. Conversely, where linked industries are not present or not heavily concentrated, there may be gaps that need to be better understood to help grow the impacts of the core industry.

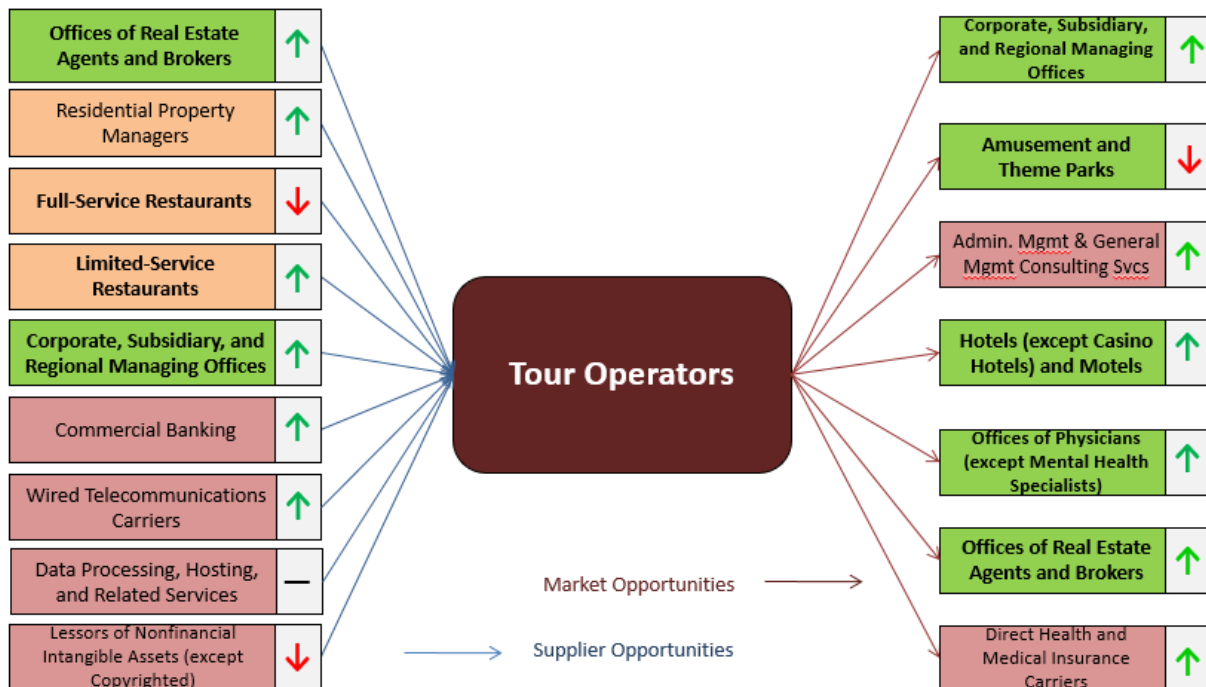
For each connected industry, the figure offers two pieces of key information. The first is the color code related to the Location Quotient (LQ) of that particular industry for the LCW. A location quotient is a measure of the distribution of employment in a region compared to national averages. If the percentage of total local employment in a given industry exactly matches the percentage that industry represents in the national economy, the Location Quotient equals 1.0. If there is a higher concentration of a given sector in the local economy compared to national averages, the LQ is greater than 1.0 and it can be reasonably assumed the local area has a comparative advantage in that industry. For example, because of tourist attractions such as Jamestown and Colonial Williamsburg, the LCW region shows very strong LQs for amusement and theme parks and hotels. Conversely, a LQ of less than 1.0 suggests a competitive disadvantage, but one that perhaps can be corrected if it is a desired industry. (For example, we can assume that there is little support for increasing the presence of petrochemical refineries, which have a very low LQ in the subject region.)

The value-chain diagrams are not intended to map the connections between every firm within an industry, but rather to paint an overall picture of how one core industry connects to related industries. The focus is on linkages—what kinds of industries are more closely networked with the core industry? It should also be noted that if an industry does not appear on the list, it does not mean that those relationships do not exist. It does, however, suggest that strong connections and extensive business relationships are less common and less direct.

Figure 1: Illustration of Value Chain Diagram



Tour Operators



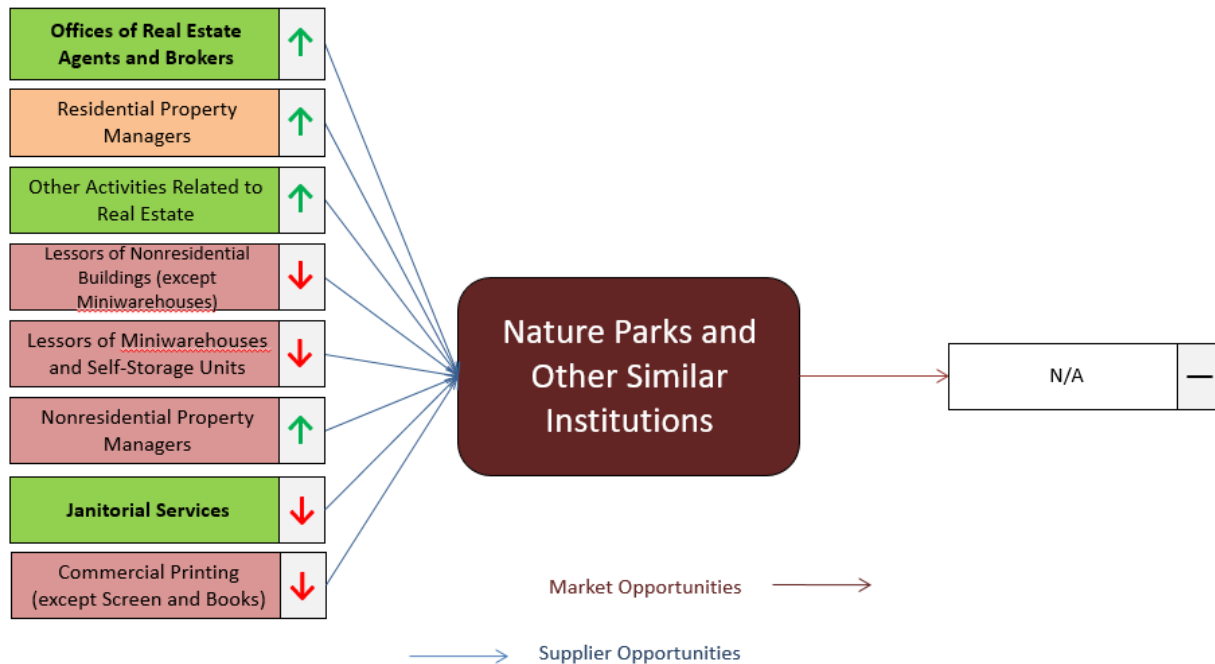
Supplier Opportunities

- Increasing tour operations business has a two-way causal relationship with restaurants (full service and limited service). Increasing tour operations would increase customer demand for restaurants. Also, with a deeper and wider restaurant industry, tour operators have more to offer clients for full-package tours. The tour operation industry would benefit from an overall increase in the number and variety of restaurants. The decrease in full-service restaurant employment over the past five years is a concern but we note there has been successful restaurant development near the Charles City Courthouse associated with tourism and bike trail activities.
- Appears to be market opportunities for web-hosting and related activities that may specialize in tour/hospitality-based businesses.

Buyer Opportunities

- Tour operators see market opportunities as “subcontractors” to hotels and amusement parks, which in the case of LCW includes history-oriented tourism as well as nature tourism. These opportunities will likely include “other” overnight accommodations.
- Other industries in the buyer category may seem strange at first glance but represent market opportunities for tour operators. For example, a company may hire a tour operator for a corporate or client outing. This list and the expanded list included in the technical appendix could help new eco-tour operators identify potential customers.

Nature Parks and Other Similar Institutions



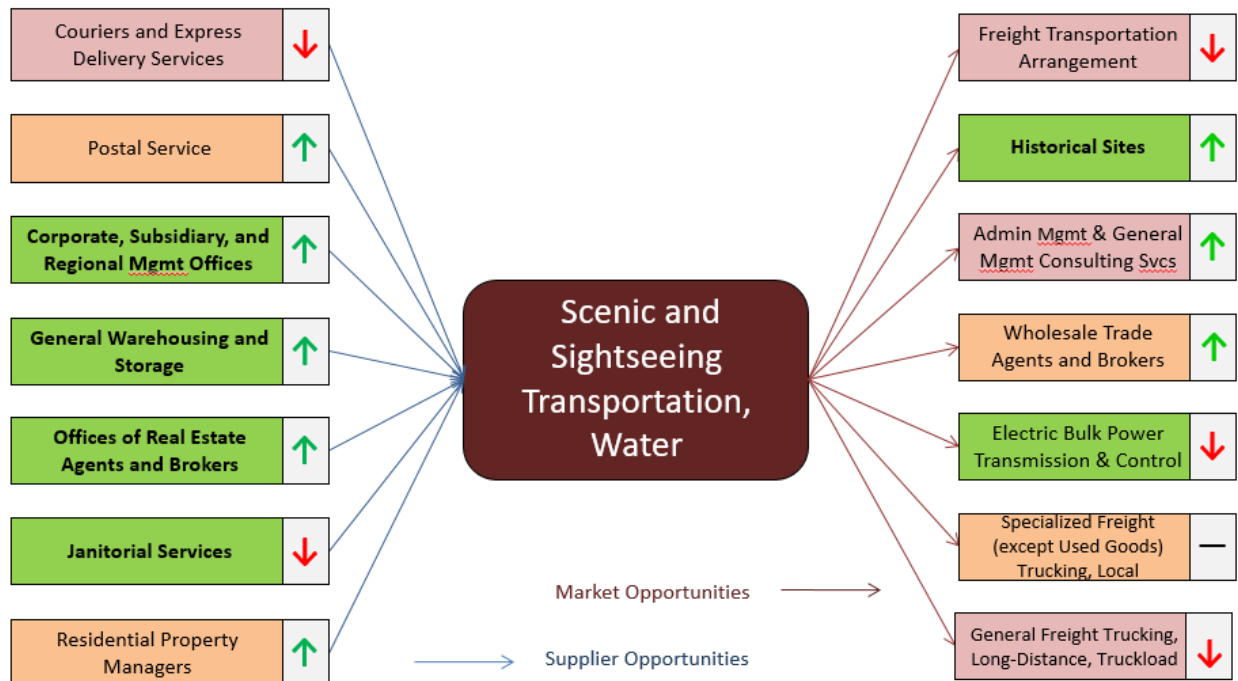
Supplier Opportunities

- Business growth opportunities in the value chain for Nature Parks reflects industries and activities that support park operations (such as habitat and wildlife management and scientific research) and, to a lesser extent, park real estate transactions (buying or selling property).
- Residential real estate services are often related to the provision of housing for park personnel, which can be seasonal or permanent.
- Janitorial services for park facilities and commercial printing of notices, guidebooks, and related materials round out the upstream opportunities.

Buyer Opportunities

- Unlike most other sectors, there is little connection for downstream marketing since most users are consumers. Remember that our value chain assessment does not include household purchases. This is not to say that a company never rents a pavilion or other structure at a nature park, but that activity in the LCW does not occur at measurable levels in our available datasets.

Scenic and Sightseeing Water Transportation



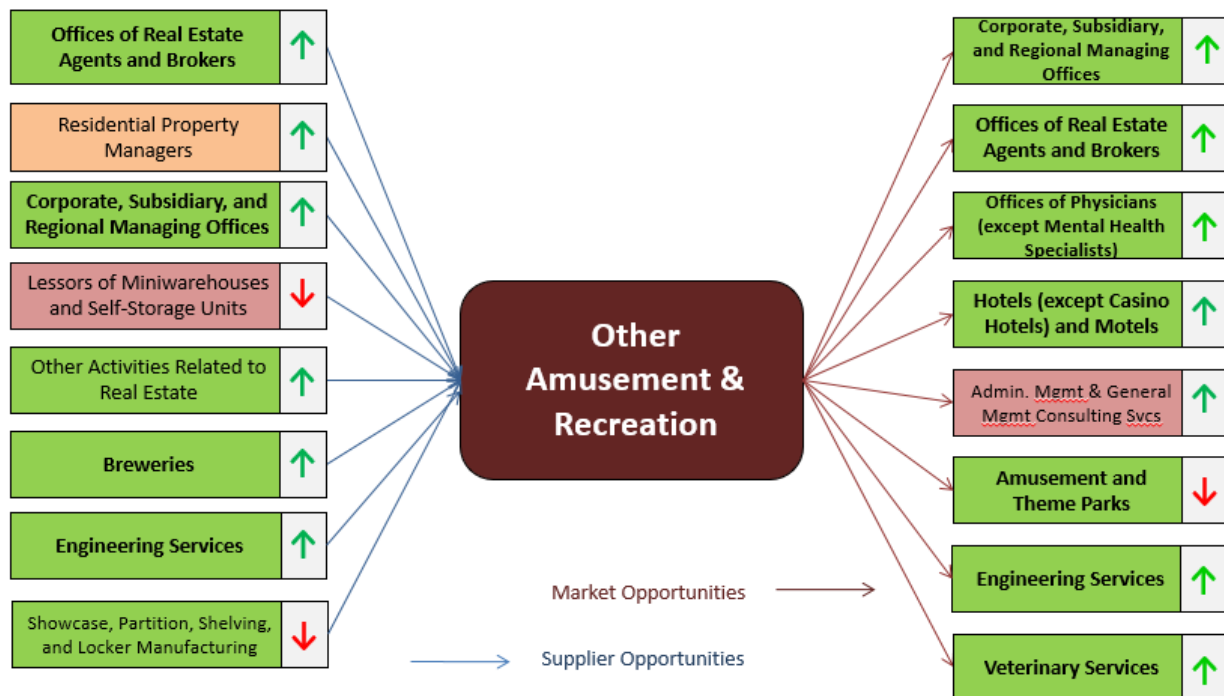
Supplier Opportunities

- Business growth opportunities in the value chain for Water Tour companies largely relates to real estate, either from a transactional or maintenance perspective.
- There are certainly other professional services provided to Water Tour companies, but the overall magnitude of the business opportunities is not large

Buyer Opportunities

- Similar to the Tour Operators sector, most downstream market opportunities represent clients. It is reasonable to ask why freight transportation companies or electric utilities would be purchasing Scenic and Sightseeing Water Transportation services. The answer relates to marketing activities by those firms. This sector includes fishing guides. If a trucking company organizes a fishing charter for client entertainment, the inter-industry transaction would show up in this value chain.
- The list of buyer opportunities is a generalized list of potential customers for water tour operators. We would expand Historical Sites to include Scenic and Nature Sites.

All Other Amusement and Recreation Industries



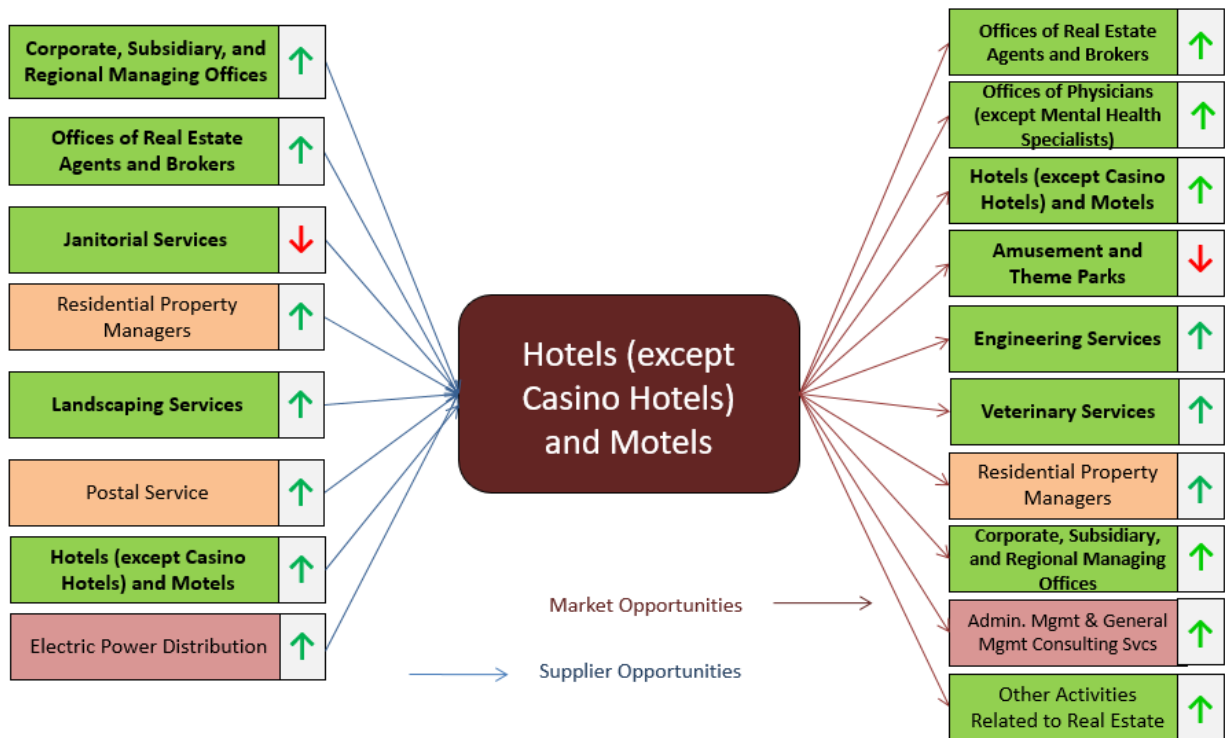
Supplier Opportunities

- Referring to Table 1, this industry covers a wide range of activities such as day camps, paddling that does not include a marina, bicycling, hiking and horse-riding stables, which we find to be closely related to conservation lands. It also includes miniature golf courses, archery ranges and shooting ranges, billiard halls, and recreational sports leagues with only the most tenuous connection to nature areas as potential other activities in which ecotourists may engage. The nature of the activity will dictate the supplier side opportunities.
- Real estate related services are an emerging theme in this analysis.
- Breweries are capturing the type of entertainment facilities that typically service alcohol for on-premises consumption. Wineries may be another option, though the underlying data analysis does not necessarily support that conclusion.
- Engineering services most likely is connected through the development and renovation of physical infrastructure.
- Hotels being an important “buyer” industry suggests the B&B and other types of accommodation providers would also benefit from growth in this industry sector.

Buyer Opportunities

- The buyer opportunities are a mix of usual hospitality sector cluster activities connecting hotels and amusement parks, and the connection with corporate outings. Natural areas would also likely gain visitors as this industry expands.

Hotels and Motels



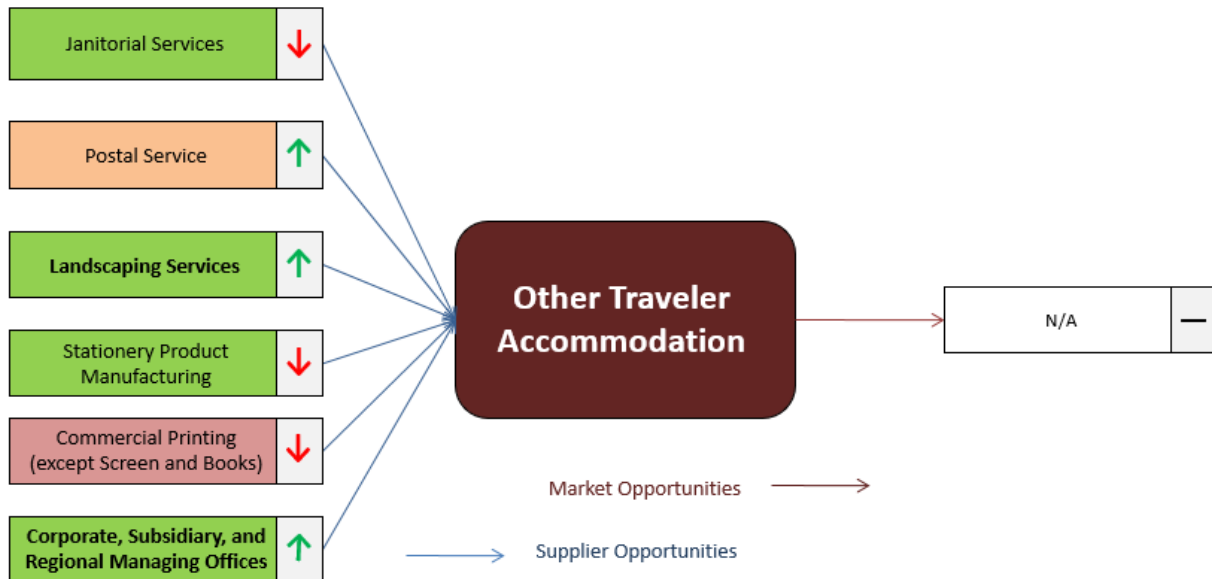
Supplier Opportunities

- As would be expected for a region with a long-term track record of attracting tourists to a rich and diverse set of attractions and amenities, the hotel industry cluster is well represented in the LCW with lots of industries in the supplier and market sides of the diagram showing distinct regional competitive advantage. However, our general observation is that much of this cluster is concentrated on the eastern side of the region. A comprehensive economic development strategy will look to expand these business opportunities in the western half of the LCW.

Buyer Opportunities

- The mix of industries on the right side of the diagram reflect two phenomena:
 - Lodging related to business travel
 - Renting hotel facilities to host local and non-local corporate meetings and events.

All Other Traveler Accommodation



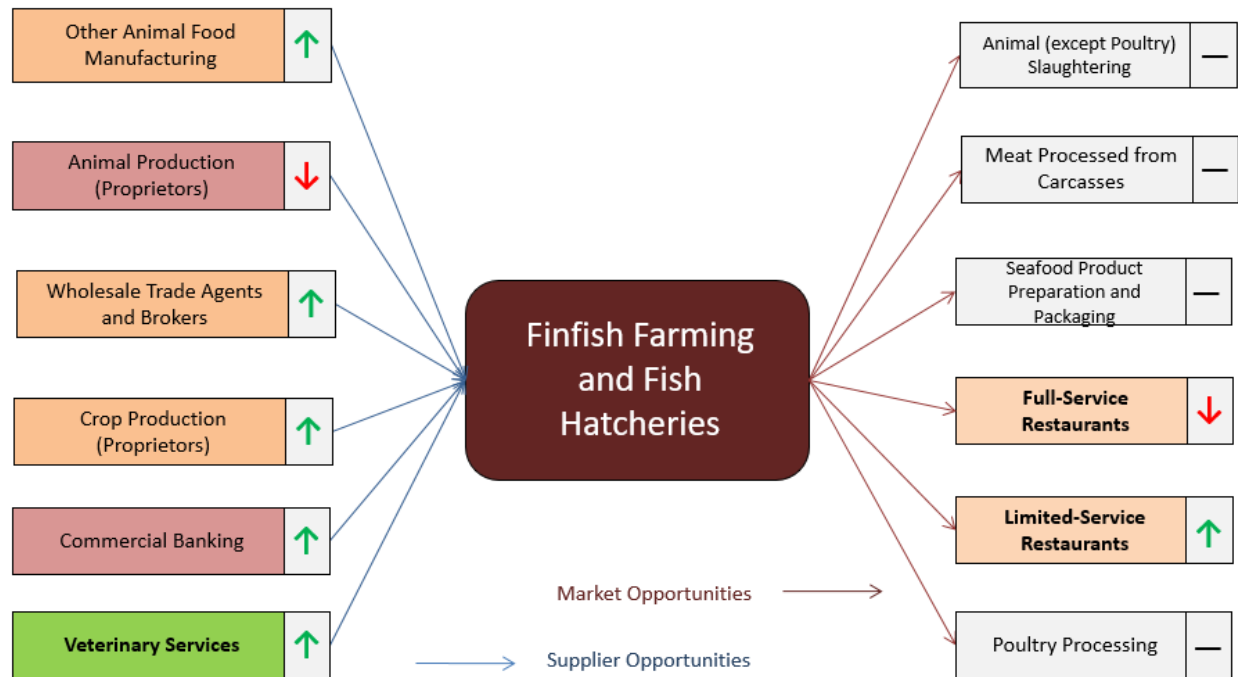
Supplier Opportunities

- This sector includes Bed & Breakfast style lodging, serviced cabins, guesthouses and hostels, and campsites. This would also include short term rentals through platform providers like Airbnb and VRBO. Longer term rental housing is not included in this sector.
- The supplier network includes:
 - Facility service providers (janitorial and landscaping)
 - Marketing materials (stationary and related materials, commercial printing)
 - Management services.

Buyer Opportunities

- While the incidence of business travelers using Airbnb and similar services is increasing, it does not yet show up in our inter-industry purchase matrices

Finfish Farming and Fish Hatcheries



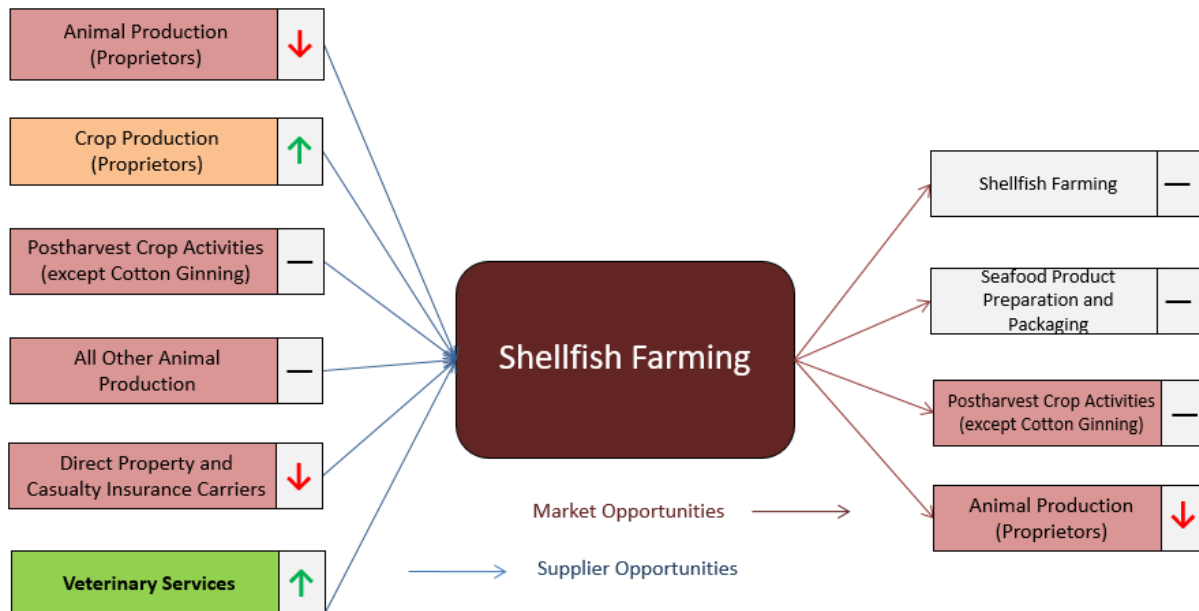
Supplier Opportunities

- As a potential new ecologically sustainable watershed-based industry, there is not existing value chain in the LCW. However, key elements of such a value chain are present. Agricultural production in the region could provide feedstock for a finfish farm industry, and it is likely that existing wholesale trade firms could adapt to this new business opportunity.
- There are existing businesses and individuals with appropriate skills in the region to support a finfish farming industry.

Buyer Opportunities

- Many of the industries that would buy finfish from local producers do not currently exist in the LCW, according to employment data. However, these industries do exist in relatively close proximity, such as the poultry industry on the eastern shore, offering ready-made markets for new firms in the LCW.
- As a finfish farm develops, there would be opportunity to attract or encourage the startup of a local food processing operation creating new job opportunities and enhancing the tax base of local jurisdictions.

Shellfish Farming



Supplier Opportunities

- Like finfish farming, shellfish farming is a potential growth opportunity in the LCW.
- An added benefit of this activity is that the shellfish themselves naturally filter water, which could enhance overall water quality that would support finfish productivity and enhance the competitive position of the LCW for eco-tourism.
- Most of the supplier industries are under-represented in the LCW, but the addition of this production industry could attract new development and industry expansion by creating new demand for supplier industry products and services.

Buyer Opportunities

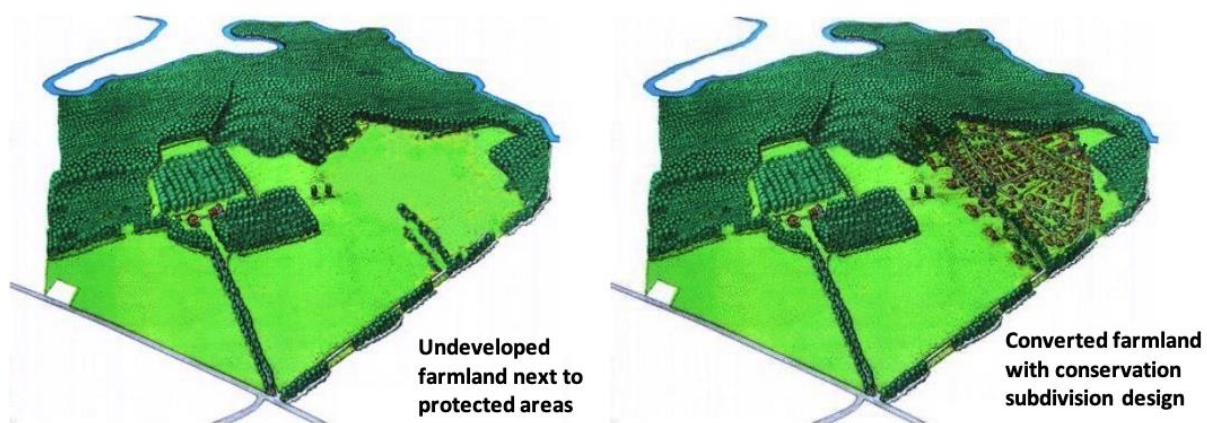
- For now, we cannot assume that shellfish produced in the river would be fit for human consumption. Other products from the shells, meat and even cultured pearls could become economically viable market products.
- Shellfish products, particularly if developed along with finfish farming, could become the basis of an aquaculture production/processing/distribution cluster in the LCW.
- Local production of seafood farming biproducts, that are used in agriculture, could be a benefit in costs and market efficiency for existing agricultural producers located in the LCW.

Conservation Communities

Maximizing the potential regional economic impacts of visitor spending related to eco-tourism and similar activities depends on the availability of amenities and retail opportunities present in the community. We want visitors to the LCW to have a meal and visit shops as a part of their trip. However, given the seasonality of much of the outdoor recreational activities, developing a robust hospitality sector requires sufficient local population to create year-round demand for these amenities. In addition, the potential business development activity described in the previous section requires workers, and those workers need housing in reasonable proximity to their jobs. Therefore, housing development that respects and protects environmentally sensitive areas becomes an important source of economic development. The development of residential communities can create hundreds of good-paying jobs for area workers. The best example of the type of development that supports the dual missions of protecting sensitive lands and the river, while creating economic opportunity in the LCW, follows a development style called Conservation Communities.

Conservation Communities, also called cluster subdivisions, involves clustering homes into a smaller area of land while using the rest to conserve open space. In addition to creating new open space conserved areas, placing a conservation development adjacent to protected areas will enhance the environmental benefits to both. The open space is maintained as trails and other such structures that increase accessibility to the surrounding natural environment for recreational activities, effectively adding nearly cost-free amenities and natural viewsheds. This is one way to add value to the land without disturbance to nature and the protected wetlands. A conservation subdivision design can also be laid out to buffer residential areas from continuing agriculture production on surrounding land. There are examples of conservation communities that have been successful. To be clear, our visions for this type of development in the LCW is to build Conservation Communities adjacent to protected watershed lands.

Figure 2: Conservation Community Conceptual Layout



Source: North Carolina Conservation Subdivision Handbook

Key Features of Conservation Communities

- Housing sites that complement the location of conserved wetlands and forests and planned open space that provides wildlife habitat.
- New community trails that connect to existing public trail network or public parks, nature trails, and other recreation amenities in protected watersheds
- Roadways that maintain the natural topography of the land: curvy rather than linear roads
- Greater flexibility in zoning allows developers more options for setback requirements and lot sizes
- Stormwater management system that is designed as a biosystem for natural wildlife and natural water management, and that controls outflows into natural waterways.
- Landscaping that uses native plants that benefit pollinators and other wildlife.

Examples:

- The town of Davidson, NC formed a subdivision ordinance in 2001 that requires 42% of development as open space, which was meant to maintain the rural character of Davidson while preserving existing protected areas.
- The Woodlands in Davidson, NC is a 50-acre residential neighborhood that protects large areas of forested land surrounding streams and conserved wetlands used as common areas for homeowners

Figure 3: The Woodlands Conservation Community



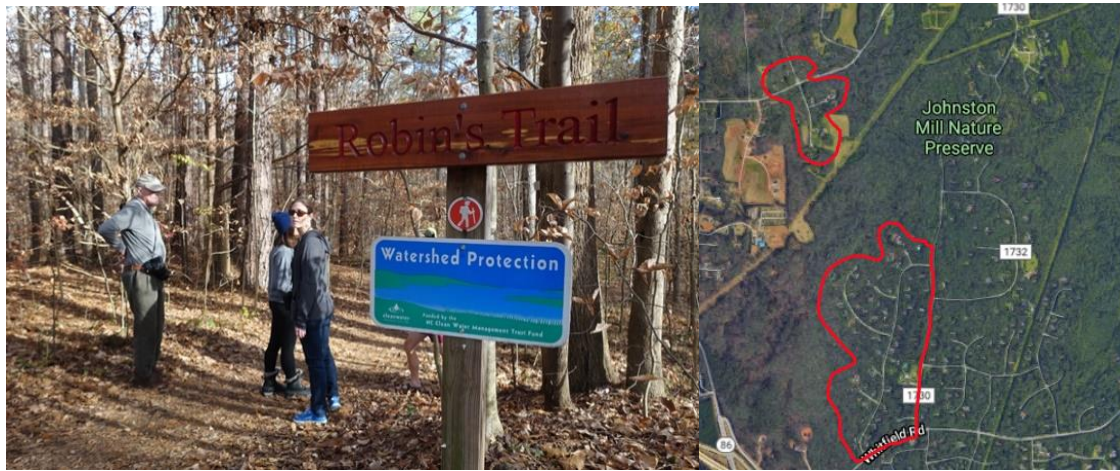
The entrance to the Woodlands, preserving open space and nearby farmland.

Source: North Carolina Conservation Subdivision Handbook

- In Chapel Hill, NC the neighborhoods of Creek Wood and North Field were created from 460 acres of the Johnston tract. 200 acres were used for conservation subdivisions. The developers worked with Triangle Land Conservancy to add the remaining 260 acres to the Johnston Mill Nature Preserve.
- The Johnston Mill Nature Preserve shown in Figure 4 was created at the time of property development. Our purpose here is to show that development areas, such as those outlined in red, can be integrated with adjacent preserved lands. Moreover, the community can be

directly connected to protected areas with in-community trails being integrated into public access trails within the protected areas.

Figure 4: Creek Wood and North Field Developments Adjacent to JMN Preserve



Source: Google Earth, The Intrepid Tourist

- The Windrush subdivision in Waukesha County, Wisconsin divided a 100-acre lot into 56 acres reserved for open space with trails and a rec center, and 57 houses on half acre lots on the remaining acreage.

The consideration of encouraging population growth as a part of a regional economic development strategy does not presume any forced re-zoning of land or promoting activities that would inhibit important agri-business activities in the LCW. However, intelligently designed communities that treat the preserved lands on the LCW as a property-value enhancing amenity would support new jobs and create important revenue sources for local jurisdictions, and as suggested above, help deepen the economic benefits associated with ecologically sustainable businesses in the region. Importantly, state code⁷ already includes specific provisions for Conservation Communities, which can speed the path to growth and development.

Conclusions

As demonstrated in previous analyses, the conserved lands of the Lower Chickahominy River watershed generate net fiscal revenues for local jurisdictions and contribute to overall regional and local economic development activity. We find that improving overall water quality in the LCW will open a pathway to expand economic development opportunities that include traditional hospitality sector businesses like eco-tour operators and the businesses that directly support those

⁷ Code of Virginia: Provisions for clustering of single-family dwellings to preserve open space. 5.2-2286.1. "...If proposals for the clustering of single-family dwellings and the preservation of open space developments comply with the locality's adopted standards, the development and open space preservation shall be permitted by right under the local subdivision ordinance...."

sectors of the economy. However, we believe that a targeted economic development strategy focusing on just eight core industry sectors would substantially enhance the economic impacts of the preserved lands and create a range of business and employment opportunities in the LCW. These core industries include:

- Tour Operators
- Nature Parks and Similar Institutions
- Other Amusement and Recreation Industries
- Hotels and Motels
- Other Traveler Accommodations
- Finfish Farming
- Shellfish Farming.

In addition, value chain analyses provide clear evidence of the potential for these industries to become an important cluster of industries that will enhance the regional economy and provide clear economic justification for the continued protection of sensitive wetlands in the LCW. Maximizing these opportunities will require integrating these potential clusters within the overall economic development plans for the three counties and other relevant jurisdictions.

Finally, as a way to enhance the success of a LCW based economic development strategy, the plan should include the creation of Conservation Community residential developments that meet the overarching goals of protecting the river and its surrounding wetlands and forests while creating new sustainable economic development opportunities and enhancing the resilience of tax revenues for local jurisdictions.